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EXAMINER

EOFF, ANCA

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/787,407	Applicant(s) KATSUMURA, MASAHIRO	
	Examiner Anca Eoff	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 September 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Status

1. Claims 1-9 are pending in the application.
2. The foreign priority document JP 2003-52962 filed on February 28, 2003 was received and acknowledged. However, in order to benefit of the earlier filing date, a certified English translation is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
4. Claims 3 and 9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 3 depends on claim 1 and introduces the limitation for the substrate main body to be made only of "a same material as the material for the surface layer area", wherein claim 1 recites that the "surface area layer includes at least two layers of thin film" with different characteristics. For examination on the merits, claim 3 was interpreted as "The electron beam recording substrate according to claim 1, wherein said electron beam recording substrate is made only of a same material as said material of one of the layers of thin film of the surface layer area".

The limitations of claim 9 are contradictory to the limitations of claim 1.

Claim 9 introduces the limitation of a thin film in contact with the resist film containing at least one element with atomic number 21 to 36, 38 to 54, 56, 57, 72 and 80 to 83 by 50 wt% or greater and the other than said thin film contacting said resist made of a material containing at least one element with atomic number 73 to 79 by 50wt.% or greater.

However, independent claim 1 has the limitation of "the layer adjacent to the resist film has a smaller distance average λ than the layer adjacent to the substrate main body".

In fig 5 and on page 10 of the specification, the applicant is disclosing a structure comprising a substrate main body MB, an auxiliary layer 40b, a scattering layer 40a and a resist R.

The applicant is further disclosing that the scattering layer 40a is made of material comprising at least one of the elements with atomic numbers 73 to 79 by 50wt.% or greater and the other thin films are made of a material containing at least one the elements with atomic numbers 21 to 36, 38 to 54, 56, 57, 72 and 80 to 83 by 50 wt% or greater. This is in accordance with claim 1 but in contradiction with claim 9 of the instant application.

Based on the table 1 on page 9 of the specification of the instant application, the elements with atomic number 21 to 36, 38 to 54, 56, 57, 72 and 80 to 83 have distance average λ much larger than the elements with atomic numbers 73 to 79, therefore the limitation of claim 1 cannot be met.

Due to the contradictions shown above, the examiner was not able to examine on the merits claim 9

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraph of 35 U.S.C. 102 that forms the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-2, 4 and 7-8 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Mancini et al. (US Pg-Pub 2002/0122995).

With regard to claims 1-2 and 4, Mancini et al. disclose a lithographic template comprising :

- a substrate (12);
- an etch-stop layer (16);
- a patterning layer (20), equivalent to the surface layer area of the instant application, and
- a photoresist layer (24), situated on top of the patterning layer (20) (fig.4 and par.0017-0021).

The etch-stop layer (16) and the patterning layer (20) are equivalent to the "two layers of thin film in between the substrate main body and the resist film" of the instant application. The etch-stop layer (16) is equivalent to the "thin film adjacent to the

substrate main body" and the patterning layer (20) is equivalent to the "thin film adjacent to the resist film" of the instant application.

The etch-stop layer can be made of chrome (Cr has $Z=24$) (par.0018), which has $\lambda=27.79 \mu\text{m}$.

The patterning layer can be made of:

- molybdenum Mo ($Z=42$) (par.0019), which has $\lambda=17.397 \mu\text{m}$;
- gold Au ($Z=79$) (par.0019) which has $\lambda=8.227 \mu\text{m}$;
- tantalum Ta ($Z=73$) (par.0019), which has $\lambda=9.7339 \mu\text{m}$;
- tungsten W ($Z=74$) (par.0019), which has $\lambda=8.3801 \mu\text{m}$.

Since the etch-stop layer (16) and the patterning layer (20) are made of the same materials as the thin films of the surface area layer of the instant application, it is the examiner's position that the etch stop layer (16) and the patterning layer (20) of Mancini et al. have the capability of suppressing enlargement of a scattering distribution diameter of electrons spread inside by irradiation of an electron beam from a resist film side (MPEP 2112).

The λ values shown above for the constituents of the etch-stop layer (16) and the patterning layer (20) meet the limitation of claim 1.

In the alternative, it would have been obvious to one of ordinary skill in the art at the time of the invention to use chrome Cr as the material for the etch-stop layer (16) and molybdenum Mo ($Z=42$), gold Au ($Z=79$), tantalum Ta ($Z=73$) or tungsten W ($Z=74$) as materials for the patterning layer (20), since they are clearly disclosed by Mancini et al. in par.0018-0019.

With regard to claim 7, the etch-stop layer (16) and the patterning layer (20) of Mancini et al. are equivalent to the plurality of thin films comprised in the surface area layer.

With regard to claim 8, Mancini et al. disclose that the etch-stop layer (16) can be made of 100 wt.% chromium Cr (Z=24) (par.0018) and the patterning layer (20) can be made of 100 wt. % tantalum Ta (Z=73), tungsten W (Z=74), gold Au (Z=79) (par.0019).

The etch stop layer (16) of Mancini et al. is equivalent to the "other than said thin film contacting the resist film" and the patterning layer (20) is equivalent to the "thin film in contact with the resist film" of the instant application.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mancini et al. (US Pg-Pub 2002/0122995) in view of Kanna et al. (US Pg-Pub 2004/0053161).

With regard to claim 3, Mancini et al. disclose that the substrate can be a transparent material and gives examples of a quartz material, a pyrex material, a polycarbonate, CaF_2 or Mg F_2 but fail to disclose that the transparent substrate can be made of the same material as one of the etch stop layer (16) or the patterning layer (20).

Kanna et al. disclose a process of producing integrated-circuit elements using photoresist and disclose that a transparent substrate, such as a glass substrate or an indium-tin-oxide substrate can be used (par.0262).

Since a glass substrate and an indium-tin-oxide substrate are transparent substrates, it would have been obvious to one of ordinary skill in the art at the time of the invention to use an indium-tin-oxide transparent substrate for the lithographic template of Mancini et al., with a reasonable expectation of success.

Mancini et al. further disclose that the etch-stop layer (16) can also be made of indium-tin-oxide (par.0018), wherein In has $Z=49$ and $\lambda=23.78 \mu\text{m}$.

Mancini et al. disclose that the patterning layer can be made of:

- molybdenum Mo ($Z=42$) (par.0019), which has $\lambda=17.397\text{mm}$;
- gold Au ($Z=79$) (par.0019) which has $\lambda=8.227 \text{ mm}$;
- tantalum Ta ($Z=73$) (par.0019), which has $\lambda=9.7339 \text{ mm}$;
- tungsten W ($Z=74$) (par.0019), which has $\lambda=8.3801 \text{ mm}$.

9. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mancini et al. (US Pg-Pub 2002/0122995) in view of Potter et al. (US Patent 6,015,324) and Martin et al. (US Pg-Pub 2005/0053847).

With regard to claims 5 and 6, Mancini et al. disclose a lithographic template comprising:

- a substrate (12);
- an etch-stop layer (16);

- a patterning layer (20),
- a photoresist layer (24), situated on top of the patterning layer (20) (fig.4 and par.0017-0021).

The etch-stop layer (16) and the patterning layer (20) are equivalent to the “two layers of thin film in between the substrate main body and the resist film” of the instant application. The etch-stop layer (16) is equivalent to the “thin film adjacent to the substrate main body” and the patterning layer (20) is equivalent to the “thin film adjacent to the resist film” of the instant application.

Mancini et al. disclose that the patterning layer can be made of:

- molybdenum Mo (Z=42) (par.0019), which has $\lambda=17.397\mu\text{m}$;
- gold Au (Z=79) (par.0019) which has $\lambda=8.227\mu\text{m}$;
- tantalum Ta (Z=73) (par.0019), which has $\lambda=9.7339\mu\text{m}$;
- tungsten W (Z=74) (par.0019), which has $\lambda=8.3801\mu\text{m}$.

While Mancini et al. disclose that the etch-stop layer (16) can be made of an opaque material, such as chrome (Cr) (par.0020) but fail to disclose that the etch-stop layer (16) can be made of a material comprising an element with atomic number in the range of 73 to 79 by 50wt.% or greater as required by claim 5 of the instant application

Potter discloses a method of fabricating an electron field-emission device comprising an etch-stop layer on a substrate having a base layer deposited thereon (column 5, lines 27-37). The etch-stop layer can be made of metals, such as Cr, Ta, W (column 5, lines 38-39).

Martin et al. disclose a photomask having a substantially transparent etch layer, said photomask comprising also an opaque layer which can be chrome (par.0032) or a layer made of tantalum compounds, such as Ta or TaN (par.0051).

Therefore, based on the teaching of Potter that Cr and Ta are functionally equivalent as constituents for etch-stop layers and the teaching of Martin et al. that Ta forms an opaque layer, as required by Mancini et al. in par.0018, it would have been obvious for one of ordinary skill in the art at the time of the invention to use a Ta layer as etch-stop layer (16) of the lithographic template.

A lithographic template comprising and etch-stop made of 100% by weight Ta ($Z=73$), $\lambda=9.7339$ and a patterning layer (20) made of gold Au ($Z=79$) (par.0019) which has $\lambda=8.227$ or tungsten W ($Z=74$) (par.0019), which has $\lambda=8.3801$ meets the limitations of claim 1 and 5 of the instant application.

With regard to claim 6, Mancini et al. further disclose that the substrate can be a quartz material (par.0017), wherein quartz (SiO_2) contains 46.66 % Si ($Z=14$).

Response to Amendment

10. The rejection of claim 8 under 35 U.S.C. 112, second paragraph is withdrawn following the applicants' amendment.

Response to Arguments

11. Applicant's arguments with respect to claims 1-9 have been considered but are moot in view of the new grounds of rejection. The applicant is arguing that the

references used in the previous Office Action to not teach all the features of the present amended claims. However, new grounds of rejection are presented in paragraphs of the Office Action.

On page 6 of the Remarks, the applicant is arguing that Mancini et al. do not show the features of the newly amended claims. The examiner would like to show that Mancini et al. clearly teaches a multi-layer structure comprising layers equivalent to the thin films of the surface area layer of the instant application and said layers of Mancini et al. are made of materials with the same characteristics as the thin films of the surface area layer of the instant application.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anca Eoff whose telephone number is 571-272-9810. The examiner can normally be reached on Monday-Friday, 6:30 AM-4:00 PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AE

